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HAZARDS FOR EDP CENTRES

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Evaluation and Analysis

Report 87.01.04

HAZARDS FOR EDP CENTRES

The use of computers to handle very large databases and to control thousands of transactions has led to the concentration of processing power in a few large sites. We now rely enormously on the output and processing capability of these sites. They form an essential link in the chain of processes needed to handle government transactions.

Electronic data processing (EDP) centres are subject to various natural or man-made hazards that can disrupt or shut down operations for unacceptable periods. Such a possibility calls for the study of recovery procedures and installations that will allow the processing of transactions (or at least the most essential of them) to continue or resume. Some of the recovery procedures can involve the use of backup files on an alternative site(s).

When making contingency plans, hazards should be evaluated both on the basis of their probability and on the magnitude of damage they can cause. Often, disasters that happen rarely, but which cause extensive damage, are ignored in contingency plans. Perhaps this is because many planners tend to disregard or minimize the threat of disasters they have never experienced. However, if one cannot afford to lose the processing capability of an EDP facility then no matter how rare the potential disaster, one should have a contingency plan in place.

Recognition of the priorities or the necessity of the applications running at a site are important factors in assessing the acceptable down time of an EDP system. To make a rational choice in selecting a recovery procedure/installation one has to :

- Identify the different threats (the magnitude of the damage they do and the frequency of occurrence) to which a site is exposed.

- Choose a backup facility in a way that the likelihood of a simultaneous catastrophe at both the principal and the backup site is very low. One important factor that must be considered when siting and sizing a backup facility is that some hazards occur individually, some occur in cascade and some will disturb the operations of many sites simultaneously.

This paper offers a list of potential hazards that could affect an EDP centre. The various threats are presented with the emphasis on their impact on the choice of a backup facility. One has to keep in mind that many disasters involve more than one hazard. For example, a facility may suffer water damage as a result of fire, or a gas explosion can be triggered by a building collapse.

FIRE : A computer could be destroyed or disabled because of fire. The fire could start in the equipment in the facility itself or in an adjacent room, floor or building. The equipment could be damaged by the fire or from smoke or soot that has infiltrated the electronic components.

Fire can also cause explosions by igniting gas leaks or flammable substances such as paint or paint solvent.

Choosing a backup facility located a few blocks away virtually ensures that EDP operations will continue. It is highly improbable that fire will strike both

facilities simultaneously.

FLOOD : Flooding is normally associated with a river or lake overflowing its banks. This can easily be avoided by locating the EDP site on high ground or a place far from any river or lake. However, water damage from other sources can still easily occur.

For example, water used to put out a fire in a nearby room can flood the computer room. Today fires in computer rooms are extinguished using asphyxiating gases such as CO_2 or Halon thereby avoiding water damage. However, these gases can pose a threat to life.

Another source of concern is the possibility of ruptured water pipes, either in the computer environment (e.g. washrooms, air conditioning units, etc.) or on the floors above. The choice of an EDP site should therefore include a careful assessment of these potential hazards. The possibility of broken street pipes or overflowing sewers should also be considered.

Again a backup site farther away or on higher ground should provide sufficient protection. As with fires, it is unlikely that flooding will strike both facilities simultaneously.

At the other end of the spectrum, lack of water can also shut down operations. Without water air conditioners will not work and this in turn will shut down the computer. Usually a water shortage will not last long and a backup site will not be needed. However, in the case of a lasting shortage an alternative site has to be found.

STORMS : Major storms, tornadoes and blizzards have to be considered. If the building housing an EDP centre has a weak structure and or has windows exposed to strong winds, there is a possibility that the building will collapse or expose the equipment to harsh environment.

A strongly constructed building or one located outside tornado zones is a way of reducing the risk. Careful choice of a location for the facility in the core of the building can also provide added protection.

POWER OUTAGES : For effective operation, EDP equipment requires a constant, even flow of electrical current. A power surge, even one of short duration, can cause serious damage to the computer hardware. Sometimes noise on the line can disturb the electronic components of the computer and destroy a batch being processed or some files.

The use of proper limiting and filtering equipment on the power lines is usually enough to avoid the worst damage. Complete loss of electrical power can be overcome by using reliable backup generators.

EARTHQUAKES : A severe earthquake can destroy an EDP site. Even if the facility survives the initial shock it can still be threatened by the floods, fires and loss of

communication and power lines which often follow a major earthquake.

The threat of an earthquake can be countered partly by locating the EDP site on geologically stable ground. A microzonation of a region can be done to identify the areas that have the best type of building ground. Buildings constructed on a rock base will suffer much less damage than those built on softer material such as clay. The structural resistance of the building is also an important factor.

A backup site does not have to be very far away. Only a few miles can make a large difference when considering an earthquake amplitude or the possibilities of landslides.

COMMUNICATIONS BREAKDOWN : Some computer sites rely heavily on external links for data collection and for remote processing. The types of links used (telephone, microwave, fibre optics, etc.) should be listed and classified according to need and for those that are essential, alternatives should be found that could be used in an emergency.

SABOTAGE : Sabotage or terrorism differs from natural or technological hazards in that it is an intentional act. Safeguards against such an act are usually provided by the standard software, hardware and physical security procedures of each site.

The types of sabotage to consider include : modification of files, destruction of files, "trojan horses" and physical destruction of equipment.

LOST OF KEY PERSONNEL : Each EDP site has specific procedures governing its operations. Loss of staff familiar with these procedures, either through an act of war or by natural causes could shut down EDP operations.

To counteract this possibility a good and fully indexed set of documentation should be produced. This will permit any competent staff member to operate at an unfamiliar site. However, operations will probably run at a slower speed until the staff member becomes familiar with the new procedures.

WAR : In case of war some EDP sites could become prime targets or may simply be hit in a general bombardment. Other possible threats include nuclear fallout and chemical or biological contamination. Moreover, some of the previously cited threats will become more likely, eg. sabotage and loss of water supply, communication lines, electrical power and personnel.

EMP (electromagnetic pulse) is also a possibility. A shielded room and the use of fibre optics for the lines that cross the border of the shield along with the filtration of power lines will greatly reduce the impact of EMP. Procedures can also be implemented to reduce the risk of EMP damage when sufficient warning is available. These procedures involve the physical disconnection of any long wires, such as telecommunication lines or power lines, from the equipment.

One way to overcome some of these threats is to build a hardened site. This site will likely be underground, have is own air and water filtration (or recycling)

plant, a water pumping system and an electric generator. Provision has to be made to keep the temperature acceptable (both for the people and the equipment) and to feed and house the personnel. Special care has to be paid to the communication lines as they are potentially the most vulnerable link in the facility.

Note that chemical contamination from industrial compounds or fallout from a nuclear accident is also possible in peacetime.

Aside from the hazards already described, Emergency Preparedness Canada publishes a list of 62 additional hazards. After elimination of a few threats that have nothing to do with EDP sites the list looks like this:

Air Crashes	Hail	Snow
Assassinations	Hazardous chemicals	Strikes
Avalanches	High winds	Structural collapse
Blizzards	Hurricanes	Subversion
Bomb & bomb threats	Ice storms	Terrorists
Civil disorders	Landslides	Tidal waves
Earthquakes	Power failure	Tornadoes
Explosion	Riots	Torrential rain
Flood	Sabotage	Urban fires
Forest fires	Severe thunderstorms	War.
Frost		

To summarize, the following factors should be analyzed when considering a site for an EDP centre:

Fire, Prevention and Mitigation
- — in EDP room
- — nearby (other floors) EDP room

Water Flooding
- — rupture of pipes
- — sewer overflow
- — nearby fire
- — river,lake overflow

Building Structural Strength
- — collapse prevention
- — pipes system (water, gas)

Gas Leak (explosion)
- — because of structural damage
- — because of ground damage

Quality of Electric Power

Environment Contamination

- chemical spill
- biological contamination
- nuclear accident (fallout, radiation)

Dangerous Goods Near EDP Room
- explosive chemicals (solvent, paint)
- health or life threatening chemicals

Electric Power Shortage
- due to adverse weather
- due to technical problems
- due to malevolent acts including war and sabotage

Water Shortage
- due to the rupture of building or street water pipes
- due to war condition

Adverse Weather
- tornadoes
- high-intensity winds
- freeze
- snow

Ground Composition
- solidity
- earthquake reaction
- landslide possibility

Communications Network
- reliability of components
- alternative possibilities (redundancies)

Indispensability of Personnel
- documentation of procedures

Physical Security
- intrusion of saboteur
- bomb threat

War Hazards
- EMP
- bomb explosions
- nuclear fallout
- biological, chemical contamination etc.